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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/909,277	07/19/2001	Glenn W. Gale	BUR92000136US1	2205

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EXAMINER

WINTER, GENTLE E

ART UNIT

PAPER NUMBER

1746

DATE MAILED: 04/03/2003

3

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/909,277

Applicant(s)

GALE ET AL.

Examiner

Gentle E. Winter

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-5, 7-12, 17, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,451,295 Kroll (Kroll).

2. Kroll reads on claims 1-5, 7-12, 17, and 18 as follows. Kroll discloses a method for removing contaminants from the surface of a substrate, where the substrate is silicon/semiconductor, and the contaminant is organic (see e.g. column 2, line 3 *et seq.* disclosing the removal of photoresist from a semiconductor wafer) including the steps of applying a fluid, (water is disclosed in Kroll) to the surface, lowering the temperature of the fluid so as to form a solid layer of the fluid over the surface (coating the wafer with water and cooling to a solid state). Inherently the application and freezing would entrap contaminants present on the surface. Thereafter, claim 1 discloses applying energy to the layer or substrate or both under such conditions as to result in separation of the layer including the contaminants from the surface disclosed as heating (thus addressing claims 17 and 18) to remove the water and photoresist from the wafer). Inherently, in the thawing of the ice is the application of energy to the ice. Similarly, if the ice melts heat is conveyed to the substrate. Inherently the temperature of the fluid is

Art Unit: 1746

lowered by directly reducing its temperature. Liquid nitrogen as the cooling fluid is disclosed in *inter alia* claim 11 of the patent, and supporting text in the patent.

3. Claims 1-8, 10-12, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,857,474 to Sakai et al (Sakai)

4. Sakai reads on the reference as follows: Sakai discloses a method for removing contaminants from the surface of a substrate (washing a substrate) which includes applying a fluid to the surface (supplying a gas containing atomized water to the surface of the substrate); lowering the temperature of the fluid so as to form a solid layer of the fluid over the surface (cooling a substrate to below zero and forming ice on a surface of the substrate). Inherently these steps will entrap contaminants. Applying energy to the layer or substrate or both under such conditions as to result in separation of the layer including the contaminants (dust and brush particles) from the surface (removing the ice formed on the surface of the substrate). The energy disclosed in Sakai is in the form of vibratory energy from impinging particles. See e.g. column 3, line 53 *et seq.*

5. With specific respect to claims 2 and 3 the method of is directed to a silicon semiconductor substrate (element W in figure 1 and associated text).

6. With specific respect to 5 and 6, disclosing that the fluid comprises water, pure water is disclosed (element 24 of figure 1 and associated text).

7. With specific respect to claim 7 and 8 disclosing that the energy is applied to the layer/substrate, the same is disclosed see e.g. column 1, line 54 *et seq.* the energy is in the form of mechanical energy.

8. With specific respect to claim 10 the temperature of the fluid is lowered by directly reducing its temperature. See e.g. column 1, line 51 *et seq.* (wafer is cooled and directly cools the water that is applied).

9. With specific respect to claim 11, 12, and 19-21 disclosing that the temperature of the fluid is lowered by employing a cryogenic gas in the solid or liquid phase. See e.g. column 2, line 21, disclosing that the cooling fluid is “liquefied nitrogen”. The cooling fluid is the means by which the substrate and cleaning fluid are chilled to “below zero”. See e.g. column 2, line 1 *et seq.*

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1746

10. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kroll as discussed above, and United States Patent No. 5,724,186 to Collier (Collier).

11. As to claims 14-16, each and every limitation of claims 14-16 is identically disclosed with respect to claim 1 in Kroll, except that Kroll fails to disclose that the energy used to separate the ice from the substrate is sonic energy. Seemingly any electromechanical energy would suffice as "sonic" energy, however, Collier explicitly discloses the use of sonic energy. Specifically, Collier discloses a self cleaning plate unit comprising a planar plate member and a vibrating means mounted on the plate member. See e.g. column 2, line 33. Figure 6 and associated text discloses a range of frequencies including sonic. The artisan would have been motivated to make the instant combination for the reasons explicitly set forth in Collier, namely to break the "bonds between the mirror face and other solid deposits including ice" "allowing the debris to fall clear". See e.g. abstract. Inherently the sonic energy will be applied to the layer through the glass.

12. Claims 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kroll and Collier as discussed above and United States Patent No. 4,491,484 to Williams. Specifically, claim 13 is directed to an embodiment where the cryogenic fluid is carbon dioxide, the prior art of record discloses the claimed invention except that carbon dioxide is not explicitly disclosed. Williams shows that cryogenic carbon dioxide and cryogenic nitrogen are equivalent. Therefore, because these two cryogenic fluids were art-recognized equivalents at the time the invention was

Art Unit: 1746

made, one of ordinary skill in the art would have found it obvious to substitute cryogenic nitrogen for cryogenic carbon dioxide.

13. Claims 23-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kroll and Collier.

14. Kroll and claim 23-27 and 30 disclose a method for removing contaminants from the surface of a substrate, where the substrate is silicon/semiconductor, and the contaminant is organic (see e.g. column 2, line 3 *et seq.* disclosing the removal of photoresist from a semiconductor wafer). Applying a fluid to the surface (coating the wafer with water and cooling to a solid state); lowering the temperature of the fluid by reducing the temperature of the substrate so as to form a solid layer of the fluid over the surface and entrapping contaminants within the layer lowering the temperature of the fluid so as to form a solid layer of the fluid over the surface (coating the wafer with water and cooling to a solid state). Inherently the application and freezing would entrap contaminants present on the surface.

15. What is not disclosed in Kroll is the application of sonic energy to the layer or substrate or both under such conditions as to result in separation of the layer including the contaminants from the surface. Collier is provided for the disclosure of the application of sonic energy for the removal of ice from a substrate and as a means for cleaning the substrate. Specifically, Collier

Art Unit: 1746

discloses a self cleaning plate unit comprising a planar plate member and a vibrating means mounted on the plate member. See e.g. column 2, line 33. Figure 6 and associated text discloses a range of frequencies including sonic. The artisan would have been motivated to make the instant combination for the reasons explicitly set forth in Collier, namely to break the "bonds between the mirror face and other solid deposits including ice" "allowing the debris to fall clear". See e.g. abstract. Inherently the sonic energy will be applied to the layer through the glass.

16. As to claims 32 and 33 the temperature of the fluid is disclosed to be lowered by employing a cryogenic gas in the solid or liquid phase. Kroll discloses liquid nitrogen is the cooling fluid. See *inter alia* claim 11 of the Kroll patent, and supporting text in the patent.

17. Claim 34 rejected under 35 U.S.C. 103(a) as being unpatentable over Kroll and Collier and Williams. Specifically, claim 34 is directed to an embodiment where the cryogenic fluid is carbon dioxide, the prior art of record discloses the claimed invention except that carbon dioxide is not explicitly disclosed. Williams shows that cryogenic carbon dioxide and cryogenic nitrogen are equivalent. Therefore, because these two cryogenic fluids were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute cryogenic nitrogen for cryogenic carbon dioxide.

18. Claims 23-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai and Collier.

19. Sakai reads on the reference as follows: Sakai discloses a method for removing contaminants from the surface of a substrate (washing a substrate) which includes applying a fluid to the surface (supplying a gas containing atomized water to the surface of the substrate); lowering the temperature of the fluid so as to form a solid layer of the fluid over the surface (cooling a substrate to below zero and forming ice on a surface of the substrate). Inherently these steps will entrap contaminants. Applying energy to the layer or substrate or both under such conditions as to result in separation of the layer including the contaminants (dust and brush particles) from the surface (removing the ice formed on the surface of the substrate). The energy disclosed in Sakai is in the form of vibratory energy from impinging particles. See e.g. column 3, line 53 *et seq.*

20. What is not disclosed in ^{Sakai}~~Krott~~ is the application of sonic energy to the layer or substrate or both under such conditions as to result in separation of the layer including the contaminants from the surface. Collier is provided for the disclosure of the application of sonic energy for the removal of ice from a substrate and as a means for cleaning the substrate. Specifically, Collier discloses a self cleaning plate unit comprising a planar plate member and a vibrating means mounted on the plate member. See e.g. column 2, line 33. Figure 6 and associated text discloses a range of frequencies including sonic. The artisan would have been motivated to make the instant combination for the reasons explicitly set forth in Collier, namely to break the “bonds between the mirror face and other solid deposits including ice” “allowing the debris to fall

Art Unit: 1746

clear". See e.g. abstract. Inherently the sonic energy will be applied to the layer through the glass.

21. With specific respect to claims 24 and 25 the method of is directed to a silicon semiconductor substrate (element W in figure 1 and associated text).

22. With specific respect to 27 and 28, disclosing that the fluid comprises water, pure water is disclosed (element 24 of figure 1 and associated text).

23. With specific respect to claim 29 the temperature of the fluid is lowered by directly reducing its temperature. See e.g. column 1, line 51 *et seq.* (wafer is cooled and directly cools the water that is applied).

24. Claim 34 rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai and Collier and Williams. Specifically, claim 34 is directed to an embodiment where the cryogenic fluid is carbon dioxide, the prior art of record discloses the claimed invention except that carbon dioxide is not explicitly disclosed. Williams shows that cryogenic carbon dioxide and cryogenic nitrogen are equivalent. Therefore, because these two cryogenic fluids were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute cryogenic nitrogen for cryogenic carbon dioxide.

Art Unit: 1746

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gentle E. Winter whose telephone number is (703) 305-3403.

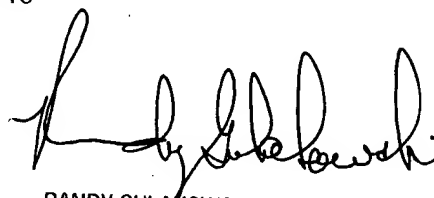
The examiner can normally be reached on Monday-Friday 7:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. The direct fax number for this examiner is (703) 746-7746.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gentle E. Winter
Examiner
Art Unit 1746

March 31, 2003


RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700